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Glacial Erratics in Shawnee, Douglas and Johnson Counties, Kansas

Paper 6 of the 1924 Meeting at McPherson
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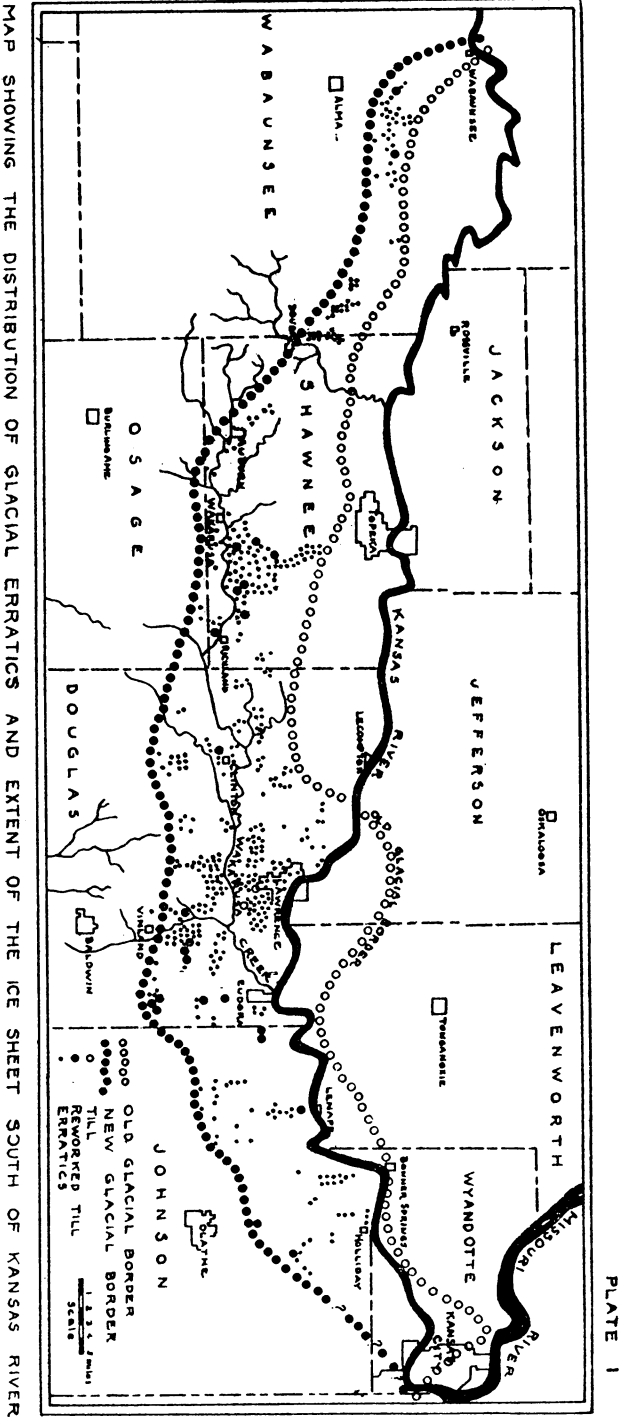
The presence of some glacial erratics in Wabaunsee, Shawnee, Douglas and Johnson counties south of the line marking the position of the maximum advance of the Kansas ice sheet has been known for a long time. These deposits have been interpreted as outwash materials some of which were supposed to have formed while the glacier advanced and others while it retreated.* During the recent investigations many new exposures of glacial pebbles and boulders were located and mapped. See Plate I. The erratics consist of pebbles and boulders of various kinds and sizes. The following list comprises the most important rock types which are represented: red and white quartzites and quartzite conglomerates, fine and coarse grained granites, mica and hornblend schists, diorites, gabbros, gneiss, basalt, iron-bearing rocks, chert, quartz, petrified wood, and local sandstones, shales and limestones.

Of the boulders, the pink to red quartzites and quartzite conglomerates are the most conspicuous and numerous and in many places constitute from 75 to 90 per cent of all the boulders present. These erratics are generally very hard, smoothly rounded and more or less polished. Some, however, are unusually well weathered, breaking down to sugar-like quartz grains when slight pressure is applied. The granites are represented by two types and next to the quartzites are the most abundant. One of the types is a light colored medium to fine-grained rock, whereas the other is coarser grained and generally of a reddish color. In size, both the quartzites and the granites vary greatly, ranging from mere pebbles to boulders over six feet in their longest dimensions. Many of the granites crumble to pieces of feldspar and quartz very readily, others are relatively firm. In general, the granites all show the effects of weathering much more than do the quartzites.

The darker igneous rocks, such as the gabbros, diorites and basalts all show characteristic subangular forms and a stage of disintegration and decomposition intermediate between the quartzites and the granites. These rocks as well as the schists and others mentioned above are less numerous than the two types first described. The local rocks are not well represented.

A study of the erratics shows at least six facts. (1) The erratics are much more numerous than is indicated in the literature. Erratic

*J. E. Todd, "Kansas During the Ice Age." Trans. Kansas Acad. Sci., Vol. XXVIII, (1917), pp. 39-44.



boulders have been described as being scattered as far south as 38 degrees, 50 minutes and pebbles to 38 degrees* North Latitude.

It is very doubtful, however, if most of these erratics can be ascribed to the glacial invasion. More likely they were carried eastward by streams coming from the Tertiary sand and gravel plains or else, as intimated by Chamberlin,** may be due to glacio-fluvial action. Todd*** has mapped and described eight localities where erratics occur south of his glacial border. A glance at the map shown on Plate I indicates that exposures of erratics are very numerous.

(2) Of more importance than the mere number of exposures of glacial drift is the fact that the erratics are very widespread and have a far greater areal distribution than is indicated on the published maps. This wide areal distribution of the northern pebbles and boulders does not harmonize well with the fluvial or glacio-fluvial hypothesis advanced to account for the few more or less restricted areas of erratics. Undoubted outwash deposits occur in the region under discussion. However, it is not reasonable to suppose that an ice sheet like the Kansan which in Kansas left only more or less patchy and thin deposits without the development of a pronounced terminal moraine**** should have distributed most of its load by means of streams coming from the melting ice sheet and should have deposited the materials over an area as widespread as that shown on the map. (Plate I).

(3) The erratics are just as numerous at a distance south of the mapped glacial border as near it. This together with the fact that (4) there is no sorting or separation of large and small materials as they are traced away from the glacial border appears to indicate direct ice action rather than stream deposition. Streams usually sort their materials.

Although the sorting may be poor, yet a more or less change in the sizes of the pebbles and boulders should be noticeable as they are traced farther and farther away from the glacial border. This, however, is contrary to the facts. Also, not only should there be a noticeable difference in the sizes of the materials carried down stream but the boulders and pebbles should become less numerous in the same direction. This also is not evidenced in the field. Almost everywhere in the region immediately north of the glacial border

*B. F. Mudge, Fourth Agricultural Report and Census, Kansas, (1875), p. 109; T. C. Chamberlin and R. D. Salisbury, "Preliminary Paper on the Driftless Area of the Upper Mississippi Valley." U. S. Geol. Survey Sixth Ann Rept., (1883), p. 314.

**T. C. Chamberlin and R. D. Salisbury, op. cit., p. 314.

***J. E. Todd, "Glacial Geology of Kansas", unpublished manuscript; Plate XI "Map of Pleistocene Formations of Northeastern Kansas," Pan-American Geologist, Vol. XL, (1923).

****J. E. Todd, "Kansas During the Ice Age." Kansas Acad. Sci., Vol. XXVIII, (1917), pp. 35, 37.

the drift is thin and at many places patchy and often represented only by scattered boulders. In fact, the country between Topeka and the glacial border west of Lawrence (see map) shows no more conclusive evidence of glaciation than the region south of it. Unless the topography at the time of the ice invasion was entirely different from what it is now, the streams coming from the melting glacier could not have had a high gradient and therefore should have dropped more and larger boulders near the ice edge and carried the smaller ones farther away.

(5) The erratics are not confined to any topographic position neither are they limited in elevation. Some are found in the valleys others on the slopes and still others on the uplands. The previously known drift was mapped as occurring in strips or else confined to definite channels in the region of the Wakarusa Valley,* as indicated before, the erratics are now known to be widespread and careful checking of barometric readings made at the exposures show variations of 30, 50, and more than 100 feet within short distances. Streams usually deposit their materials along definite channels and in such a manner that practically very little difference in elevation exists within short distances. Therefore, the disregard for elevation together with the lack of definite arrangement or distribution of the deposits favor direct deposition by the ice rather than by streams coming from the glacier.

(6) According to the previous mapping* the ice sheet crossed the valley of the Kansas River about seven miles northwest of Lawrence. Between that point and Kansas City the valley was unoccupied by the ice. It is therefore difficult to account for the numerous and widespread erratics south of the river between the two cities mentioned above for between the erratics and the melting ice sheet lay the trough of the river which undoubtedly must have served as the main outlet for the drainage coming from the glacier.

In conclusion, the writer is convinced from his study of the erratics that an ice sheet extended beyond the limits of the mapped glacial border and reached as far south as is indicated on the accompanying map, Plate I.

*J. E. Todd, "Kansas During the Ice Age", Trans. Kansas Acad. Sci. Vol. XXVIII, (1917), p. 36; Plate XI "Map of Pleistocene Formations of Northeastern Kansas." Pan-American Geologist, Vol. XL, (1923).

**J. E. Todd, op. cit., Map 1, Plate XI.

Additional Evidences of an Ice Invasion South of Kansas River in Eastern Kansas

Paper 26a of the 1927 Meeting at Lawrence
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In a paper "Glacial Erratics in Shawnee, Douglas and Johnson counties, Kansas", read before the Kansas Academy of Science in 1924, the conclusion was reached from a study of glacial erratics that